What is claimed is:

1. A method for fabricating a Bi thin film, wherein a Bi thin film is formed by electrodepositing a Bi solution onto a substrate in the deposition ratio of 0.1 – 10 μm/min by applying a current within a range of 1 – 100 mA to the Bi solution at room temperature.

2. The method of claim 1, wherein the Bi solution is $Bi(NO_3)_3 \cdot 5H_2O$.

3. The method of claim 1, wherein the fabricated Bi thin film has a MR (magnetoresistance) ratio approximately 600 % at room temperature and not less than 80,000 % at 4 K when a magnetic field of 9T is applied.

4. The method of claim 1, further comprising:

depositing a Pt or an Au underlayer to be used as an working electrode onto the substrate so as to have a thickness within a range of 50 – 500 Å before depositing a Bi thin film.

5. The method of claim 1, wherein carbon is used as a counter electrode.

6. The method of claim 1, further comprising:

heat processing the fabricated Bi thin film at a temperature within a range of 250 – 270 °C.

7. The method of claim 1, wherein a Bi thin film is formed onto a substrate in the deposition ratio of 0.1 – 10 μm/min by a sputtering method in a vacuumized chamber.

8. The method of claim 7, wherein the fabricated Bi thin film has a MR (magnetoresistance) ratio approximately 600 % at room temperature and not less than 30,000 % at 4 K when a magnetic field of 9T is applied.

9. The method of claim 7, further comprising:

heat processing the fabricated Bi thin film at a temperature within a range of 250 – 270 °C.

10. A magnetic field sensor, wherein a Bi thin film fabricated by the method of claim 1 or claim 7 is fabricated as a mesa by photolithography or electron beam lithography, and a magnetic substance having great saturation magnetization and permeability is formed at both sides of the Bi mesa as a flux concentrator.

11. A spin FET (spin-polarized field effect transistor), comprising:

a gate;

an insulating layer formed on the bottom portion of the gate;

a source/drain region formed at left/right sides of the insulating layer by using magnetic metal or a magnetic semiconductor having great spin polarization; and

a spin channel formed by using a Bi thin film fabricated according to claim

1 or claim 7.

12. A spin memory device, wherein a spin memory device includes a gate, a Bi spin channel fabricated by a method according to claim 1 or claim 7 and formed on the bottom portion of the gate and a source/drain region formed at left/right sides of the spin channel by using magnetic metal or a magnetic semiconductor having great spin polarization, and the spin memory device controls resistance by external magnetic field.